What is claimed is:

1. An image observation optical system comprising:

an image display element; and

an eyepiece optical system which introduces an image formed by said image display element to a center of an eye of an observer without forming an intermediate image, so as to allow the observer to observe said image as a virtual image,

wherein said eyepiece optical system is constructed and arranged to bend an optical axis using reflecting surfaces so as to be compact, said optical axis lying in a plane, and

wherein said eyepiece optical system is symmetrically formed with respect to said plane and includes an optical element having an entrance surface, a plurality of curved reflecting surfaces and an exit surface, at least one of said reflecting surfaces being provided with a volume hologram (HOE).

2. An image observation optical system according to claim 1, wherein said eyepiece optical system comprises a prism with a positive refracting power, and, upon an image position F0 at a midpoint, an image position Fb at one end point showing a larger chromatic aberration of magnification, and an image position Fa at another end point showing a smaller chromatic aberration of magnification being defined on a segment that is an intersection formed by said plane of symmetry of said eyepiece optical system and an image display surface, said image observation optical system satisfies the following conditions simultaneously:

$$-1 < \phi y(\text{HOE, Fa})/\phi y(\text{Total}) < 2$$

$$-1 < \phi y(\text{HOE, Fb})/\phi y(\text{Total}) < 1$$

where ϕy(HOE, Fa) is a y-direction power of said HOE at the image position Fa, ϕy(HOE, Fb) is a y-direction power of said HOE at the image position Fb, and ϕy(Total) is a y-direction power of an entire system.

3. An image observation optical system according to claim 1, wherein said eyepiece optical system is configured as a prism optical system having at least two reflecting surfaces, said HOE has one or two plane of symmetry of power, and said plane of symmetry of said HOE coincides with a plane of symmetry of a shape of a base on which said HOE is provided.

4. An image observation optical system according to claim 2, wherein said eyepiece optical system is configured as a prism optical system having at least two reflecting surfaces, said HOE has one or two plane of symmetry of power, and said plane of symmetry of said HOE coincides with a plane of symmetry of a shape of a base on which said HOE is provided.

5. An image observation optical system according to claim 2, further satisfying the following conditions simultaneously:

$$0 < \phi y(\text{HOE, Fa})/\phi y(\text{Total}) < 1$$

$$-0.5 < \phi y(\text{HOE, Fb})/\phi y(\text{Total}) < 0.5.$$

6. An image observation optical system according to claim 5, further satisfying the following conditions simultaneously:

$$0.005 < \phi y(\text{HOE, Fa})/\phi y(\text{Total}) < 0.4$$

$$-0.2 < \phi y(\text{HOE, Fb})/\phi y(\text{Total}) < 0.2.$$

7. An image observation optical system according to claim 1, wherein said eyepiece optical system is configured as a prism optical system and every *X*-direction power of said HOE is positive.

8. An image observation optical system according to claim 2, wherein said eyepiece optical system is configured as a prism optical system and every *X*-direction power of said HOE is positive.

9. An image observation optical system according to claim 3, wherein every *X*-direction power of said HOE is positive.

10. An image observation optical system according to claim 4, wherein every *X*-direction power of said HOE is positive.

11. An image observation optical system according to claim 1, wherein said eyepiece optical system comprises a prism with a positive refracting power that has at least one reflecting surface, and said HOE is formed on a surface of said prism.

12. An image observation optical system according to claim 2, wherein said prism has at least one reflecting surface and said HOE is formed on a surface of said prism.

13. An image observation optical system according to claim 3, wherein said prism optical system comprises a prism with a positive refracting power that has at least one reflecting surface,

and said HOE is formed on a surface of said prism.

14. An image observation optical system according to claim 4, wherein said prism has at least one reflecting surface, and said HOE is formed on a surface of said prism.

15. An image observation optical system according to claim 1, wherein said eyepiece optical system comprises a prism with a positive refracting power that has at least one reflecting surface, and said HOE is configured to have a rotationally asymmetric power so as to compensate rotationally asymmetric chromatic aberration of magnification at a position between said image display element and a pupil of the observer.

16. An image observation optical system according to claim 2, wherein said prism has at least one reflecting surface, and said HOE is configured to have a rotationally asymmetric power so as to compensate rotationally asymmetric chromatic aberration of magnification at a position between said image display element and a pupil of the observer.

17. An image observation optical system according to claim 3, wherein said prism optical system comprises a prism with a positive refracting power that has at least one reflecting surface, and said HOE is configured to have a rotationally asymmetric power so as to compensate rotationally asymmetric chromatic aberration of magnification at a position between said image display element and a pupil of the observer.

18. An image observation optical system according to claim 4, wherein said prism has at least one reflecting surface, and said HOE is configured to have a rotationally asymmetric power so as to compensate rotationally asymmetric chromatic aberration of magnification at a position between said image display element and a pupil of the observer.

19. An image observation optical system according to claim 1, wherein said eyepiece optical system comprises a prism with a positive refracting power and at least two HOEs between said image display element and an exit pupil, and, upon an image position F0 at a midpoint being defined on a segment that is an intersection formed by said plane of symmetry of said eyepiece optical system and an image display surface, said image observation optical system satisfies the following condition:

$$| \phi y(\mathrm{HOE},\ \mathrm{F0}) / \phi y(\mathrm{Total}) | \leq 0.25$$

where ϕy(HOE, F0) is a y-direction power of said HOEs at the image position F0, and ϕy(Total) is a y-direction power of an entire system.

20. An image observation optical system according to claim 2, wherein said eyepiece optical system comprises at least two HOEs between said image display element and an exit pupil, and said image observation optical system satisfies the following condition:

$$| \phi y(\mathrm{HOE},\ \mathrm{F0}) / \phi y(\mathrm{Total}) | \leq 0.25$$

where ϕy(HOE, F0) is a y-direction power of said HOEs at the image

position F0, and ϕy(Total) is a y-direction power of an entire system.

21. An image observation optical system according to claim 3, wherein said prism optical system comprises a prism with a positive refracting power and at least two HOEs between said image display element and an exit pupil, and, upon an image position F0 at a midpoint being defined on a segment that is an intersection formed by said plane of symmetry of said eyepiece optical system and an image display surface, said image observation optical system satisfies the following condition:

$$| \phi y(\text{HOE, F0}) / \phi y(\text{Total}) | \leq 0.25$$

where ϕy(HOE, F0) is a y-direction power of said HOEs at the image position F0, and ϕy(Total) is a y-direction power of an entire system.

22. An image observation optical system according to claim 4, wherein said eyepiece optical system comprises at least two HOEs between said image display element and an exit pupil, and said image observation optical system satisfies the following condition:

$$| \phi y(\text{HOE, F0}) / \phi y(\text{Total}) | \leq 0.25$$

where ϕy(HOE, F0) is a y-direction power of said HOEs at the image position F0, and ϕy(Total) is a y-direction power of an entire system.

23. An image observation optical system according to claim 19, 20, 21 or 22, further satisfying the following condition:

$$|\phi y(\text{HOE, F0})/\phi y(\text{Total})| \leq 0.10.$$

24. An image observation optical system according to claim 23, further satisfying the following condition:

$$|\phi y(\text{HOE, F0})/\phi y(\text{Total})| \leq 0.025.$$

25. An image observation optical system according to claim 1, 2, 3 or 4, wherein said eyepiece optical system comprises a prism with a positive refracting power, a HOE, and an optical member constructed with two opposite surfaces that are formed as plane surfaces non-parallel to one another.

26. An image observation optical system according to claim 25, wherein said optical member constructed with two opposite surfaces that are formed as plane surfaces non-parallel to one another is disposed between said image display element and said prism with a positive refracting power.

27. An image observation optical system according to claim 25, wherein said optical member constructed with two opposite surfaces that are formed as plane surfaces non-parallel to one another is disposed between a pupil of the observer and said prism with a positive refracting power.

28. An image observation optical system according to claim 1, 2, 3 or 4, wherein said HOE is covered with a dust shield member.

29. An image observation optical system according to claim

28, wherein said dust shield member comprises a case which accommodates said image observation optical system and a cover through which light emergent from said image observation optical system is transmitted.

30. An image observation optical system according to claim 25, wherein said optical member constructed with two opposite surfaces that are formed as plane surfaces non-parallel to one another acts also as a cover through which light emergent from said image observation optical system is transmitted.

31. An image observation optical system according to claim 25, wherein said HOE is applied to said optical member constructed with two opposite surfaces that are formed as plane surfaces non-parallel to one another.

32. An image observation optical system according to claim 1, 2, 3 or 4, wherein said eyepiece optical system comprises a prism with a positive refracting power, a HOE, and two optical members each constructed with two opposite surfaces that are formed as plane surfaces non-parallel to one another, and said HOE is sandwiched between said two optical members each constructed with two opposite surfaces that are formed as plane surfaces non-parallel to one another.

33. A head-mount type image display apparatus comprising:

a main frame in which an image observation optical system is arranged, and;

a support member which is constructed to be mounted on lateral sides of a head of an observer so as to hold said main frame in front of a face of the observer;

wherein said image observation optical system comprises:

an image display element; and

an eyepiece optical system which introduces an image formed by said image display element to a center of an eye of the observer without forming an intermediate image, so as to allow the observer to observe said image as a virtual image,

wherein said eyepiece optical system is constructed and arranged to bend an optical axis using reflecting surfaces so as to be compact, said optical axis lying in a plane,

wherein said eyepiece optical system is symmetrically formed with respect to said plane and includes an optical element having an entrance surface, a plurality of curved reflecting surfaces and an exit surface, at least one of said reflecting surfaces being provided with a volume hologram (HOE), and

wherein said support member is constructed to achieve removable mount to side frames of spectacles.

34. A head-mount type image display apparatus according to claim 33, wherein said eyepiece optical system comprises a prism with a positive refracting power, and, upon an image position F0 at a midpoint, an image position Fb at one end point showing a larger chromatic aberration of magnification, and an image position Fa at another end point showing a smaller chromatic aberration of magnification being defined on a segment that is an intersection formed by said plane of symmetry of said eyepiece

optical system and an image display surface, said image observation optical system satisfies the following conditions simultaneously:

$$-1 < \phi y(\text{HOE, Fa})/\phi y(\text{Total}) < 2$$

$$-1 < \phi y(\text{HOE, Fb})/\phi y(\text{Total}) < 1$$

where ϕy(HOE, Fa) is a y-direction power of said HOE at the image position Fa, ϕy(HOE, Fb) is a y-direction power of said HOE at the image position Fb, and ϕy(Total) is a y-direction power of an entire system.

35. A head-mount type image display apparatus according to claim 33, wherein said eyepiece optical system is configured as a prism optical system having at least two reflecting surfaces, said HOE has one or two plane of symmetry of power, and said plane of symmetry of said HOE coincides with a plane of symmetry of a shape of a base on which said HOE is provided.

36. A head-mount type image display apparatus according to claim 34, wherein said eyepiece optical system is configured as a prism optical system having at least two reflecting surfaces, said HOE has one or two plane of symmetry of power, and said plane of symmetry of said HOE coincides with a plane of symmetry of a shape of a base on which said HOE is provided.

37. A head-mount type image display apparatus according to claim 33, 34, 35 or 36, wherein said image observation optical system and an optical system for spectacles are integrally arranged in said main frame.

38. A head-mount type image display apparatus according to claim 33, 34, 35 or 36, wherein said support member is constructed to achieve removable mount to side frames of spectacles.

39. A head-mount type image display apparatus according to claim 33, 34, 35 or 36, wherein a pair of said image observation optical systems are arranged in parallel as left and right systems for providing binocular view.